Staff Review

2008 PM BART Determination and Recommended Alternative to BART for NOx

Utah Division of Air Quality

May 13, 2015

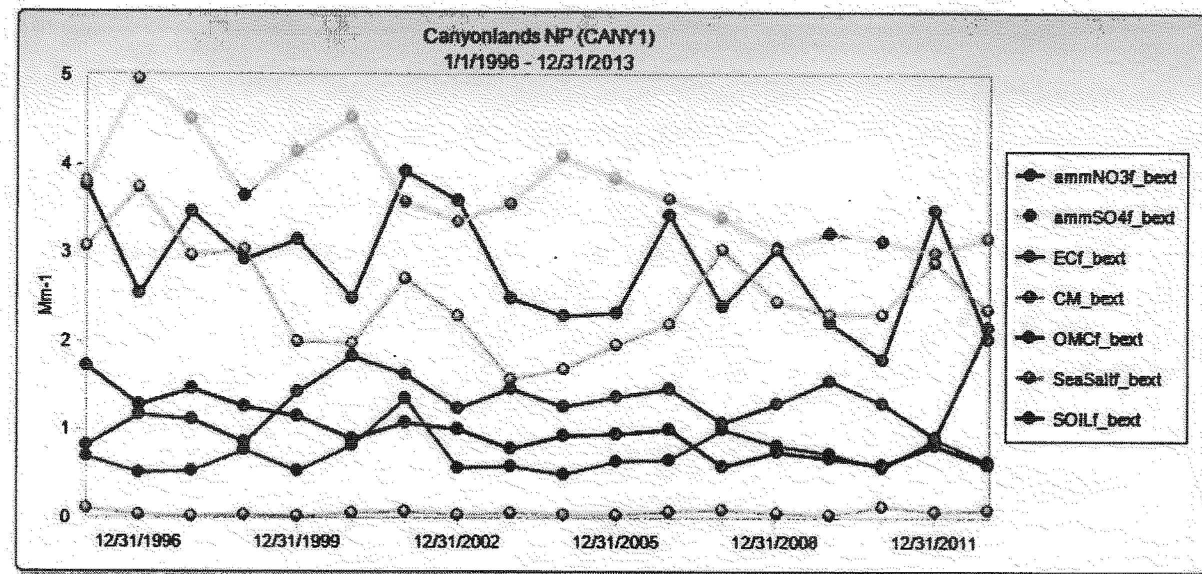
I. Purpose

On December 14, 2012, the Environmental Protection Agency (EPA) disapproved the Best Available Retrofit Technology (BART) determination for nitrogen oxides (NOx) and particulate matter (PM) that was adopted in Utah's 2008 Regional Haze State Implementation Plan (RH SIP). The purpose of this analysis is to provide additional documentation to support the 2008 BART determination for PM and to recommend an alternative to BART for NOx that will provide greater visibility improvement than would be achieved through the installation of the most stringent NOx controls on the four electrical generating units (EGU) that are subject to BART.

II. History

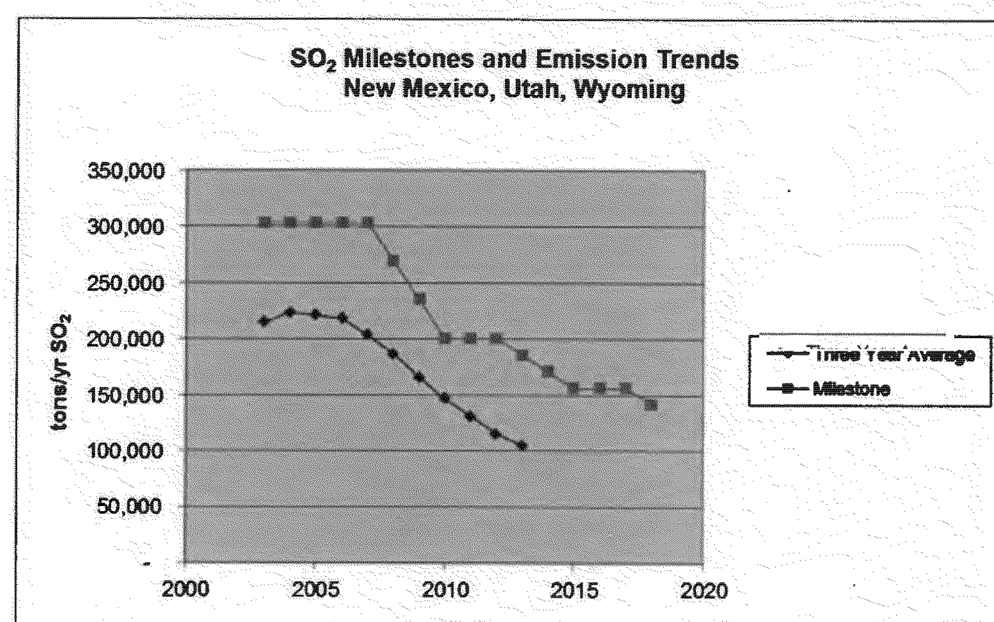
Utah's RH SIP, originally adopted in 2003, was based on the recommendations of the Grand Canyon Visibility Transport Commission (GCVTC). The GCVTC evaluated haze at Class I Areas on the Colorado Plateau, and determined that stationary source reductions should be focused on sulfur dioxide (SO_2) because it is the pollutant that has the most significant impact on haze on the Colorado Plateau. Utah's 2008 BART determination was developed within the context of the overall SIP and reflected this focus on SO_2. Figure 1 shows the contributions of various species to visibility impairment at Canyonlands National Park. As can be seen, sulfate (ammSO4) is the most significant contributor to haze. Fire (OMC) and dust (CM) are also a significant components but the impact is variable from year to year.

Figure 1. Speciated Annual Average Light Extinction at Canyonlands.



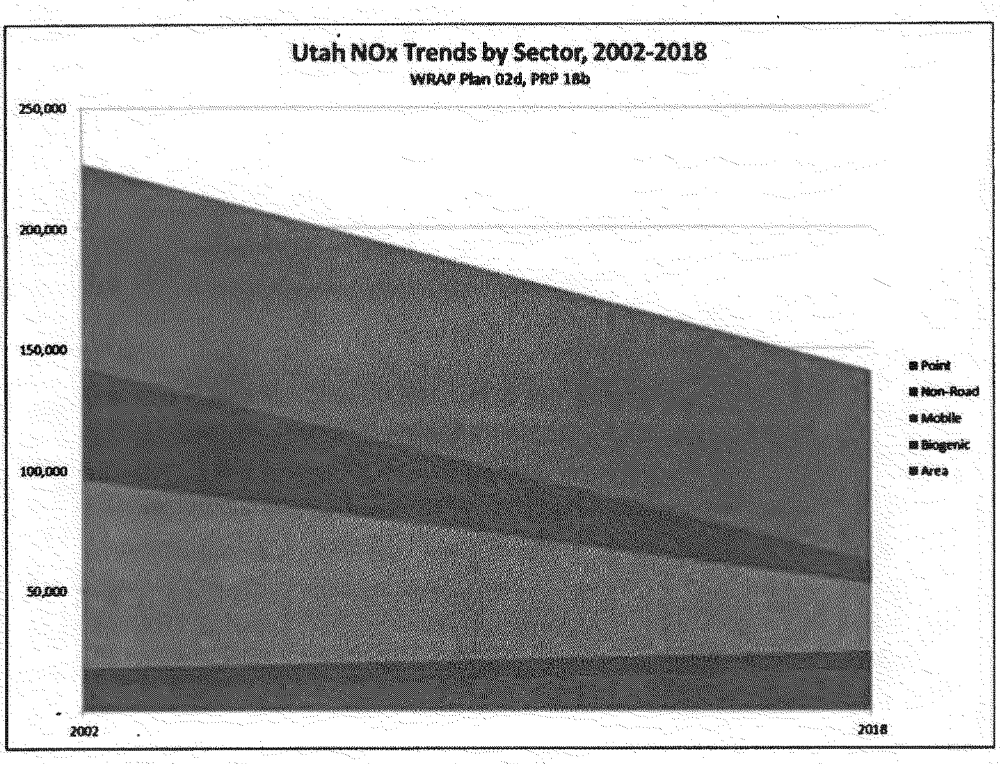
Utah's 2003 RH SIP included SO_2 emission milestones with a backstop regulatory trading program to ensure that SO_2 emissions in the transport region decreased substantially between 2003 and 2018. The milestones were adjusted in 2008 and 2011 to reflect changes in the number of states participating in the regional program. Actual SO_2 emissions decreased by 51% between 2003 and 2013 in the current 3-state region, and in 2013 were significantly below the 2018 milestone in Utah's RH SIP (See Figure 2).

Figure 2. SO_2 Milestones and Emission Trends



While Utah's RH SIP is focused on achieving SO_2 reductions from stationary sources, substantial reductions in nitrogen oxide (NOx) emissions will also occur from stationary sources as well as mobile and non-road sources. Figure 3 shows the projected decrease in NOx emissions between 2002 and 2018 as documented in Section K of Utah's 2008 RH SIP.[1]

Figure 3. Utah RH SIP Expected NOx Reductions 2002-2018.



A. BART Determination in 2008 RH SIP

On September 3, 2008, the Utah Air Quality Board adopted a revision to Utah's RH SIP to include Best Available Retrofit Technology (BART) requirements for NO_x and particulate matter (PM) as required by 40 CFR 51.309(d)(4)(vii). PacifiCorp's Hunter Unit 1, Hunter Unit 2, Huntington Unit 1, and Huntington Unit 2 fossil fuel fired electric generating units (EGUs) were determined to be subject to BART. The 2008 RH SIP required PacifiCorp to install the following BART controls at these EGUs:

Hunter Units 1 and 2:

- Conversion of electrostatic precipitators to pulse jet fabric filter bag-houses.
- The replacement of first generation low-NO_x burners with Alstom TSF 2000TM low-NO_x firing system and installation of two elevations of separated overfire air.
- Upgrade of flue gas desulfurization system to > 90% sulfur dioxide removal.

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[1] WRAP Plan 02d and PRP 18b inventory (PRP 18a mobile)
http://vista.cira.colostate.edu/TSS/Results/Emissions.aspx

Huntington Units 1 and 2:

- Conversion of electrostatic precipitators to pulse jet fabric filter bag-houses.
- The replacement of first generation low-NO_x burners with Alstom TSF 2000TM low-NO_x firing system and installation of two elevations of separated overfire air.
- Installation of a new wet-lime, flue gas de-sulfurization system at Unit 2 (FGD).
- Upgrade of flue gas desulfurization system to > 90% sulfur dioxide removal at Unit 1.

The emission rates established in the 2008 RH SIP for Hunter Units 1 and 2 and Huntington Units 1 and 2 were more stringent than the presumptive BART emission rates for SO_2 and NO_x established in 40 CFR Part 51 Appendix Y, Guidelines for BART Determinations under the Regional Haze Rule as shown in Table 1. (Note, Table 1 corrects a typographical error in Table 5 of the RH SIP where the permitted rate for PM was listed as 0.05 lb/MMBtu when it should have been 0.015 lb/MMBtu, the limit established in the approval orders for each of the units.)

Table 1. BART Emission Rates in Utah's 2008 SIP

Units	Utah Permitted Rates[2]			Presumptive BART Limits[3]		Year of Installation
Rate: lb/MMBtu	SO_2[a]	NOx[a]	PM	SO_2	NOx	
Hunter 1	0.12	0.26	0.015	0.15	0.28	2014
Hunter 2	0.12	0.26	0.015	0.15	0.28	2011
Huntington 1	0.12	0.26	0.015	0.15	0.28	2010
Huntington 2	0.12	0.26	0.015	0.15	0.28	2006

[a]30-day rolling average

[2] Utah Division of Air Quality Approval Orders: Huntington Unit 2 - AN0238012-05, Huntington Unit 1 - DAQE-AN0102380019-09 (note – on January 19, 2010 an administrative amendment was made to the 2009 AO), Hunter Units I and 2 - DAQE-AN0102370012-08.

[3] 40 CFR Part 51 Appendix Y Guidelines for BART Determinations under the Regional Haze Rule (70 Federal Register 39135)

B. Partial Approval, Partial Disapproval of Utah's Regional Haze SIP

On December 14, 2012, EPA approved the majority of Utah's Regional Haze SIP but disapproved Utah's BART determinations for NOx and PM for PacifiCorp's Hunter Unit 1, Hunter Unit 2, Huntington Unit 1, and Huntington Unit 2[4]. EPA determined that the SIP did not contain a full 5-factor analysis as required by the rule. Prior to EPA's disapproval, Utah's BART determination was in place and enforceable under state law and state permits. The required controls were installed and operating on three of the four EGUs prior to EPA's proposed disapproval, and were installed on the 4th EGU in 2014 as required by Utah's SIP under state law.

III. BART for Particulate Matter

In June 2012, after EPA had proposed to disapprove Utah's BART determination, PacifiCorp prepared a new 5-factor BART analysis to satisfy the requirements of the BART rule. PacifiCorp submitted an update to that analysis on August 5, 2014 to address issues that EPA had raised with other regional haze SIPs.

PacifiCorp's 5-Factor analysis identified three available technologies: upgraded electrostatic precipitator (ESP) and flue gas conditioning (0.040 lb PM_{10}/MMBtu); polishing fabric filter (0.015 lb PM10/MMBtu); and replacement fabric filter (0.015 lb PM_{10}/MMBtu). The 2008 BART determination had required PacifiCorp to install a fabric filter baghouse with a PM emission limit of 0.015 lb/MMBtu at Hunter Units 1 and 2 and Huntington Units 1 and 2[5]. DAQ staff have reviewed PacifiCorp's 2012 analysis and determined that the baghouse technology required in 2008 is still the most stringent technology available and 0.015 lb PM/MMBtu represents the most stringent emission limit. The PM emission limit has been added to SIP Section IX, Part H.21 and H.22 to ensure that it is federally enforceable.

40 CFR Part 51, Appendix Y, *Guidelines for BART Determinations Under the Regional Haze Rule*, allows a streamlined 5-factor analysis when the most stringent controls are already required.

> "If you find that a BART source has controls already in place which are the most stringent controls available (note that this means that all possible improvements to any control devices have been made), then it is not necessary to comprehensively complete each following step of the BART analysis in this section. As long as these most stringent controls available are made federally enforceable for the purpose of implementing BART for that source, you may skip the remaining analyses in this section, including the visibility analysis in step 5. Likewise, if a source commits to a BART determination that consists of the most stringent controls available, then there is no need to complete the remaining analyses in this section." (40 CFR Part 51, Appendix Y, Section D.9)

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[4] 77 FR 74355

[5] The AOs established a PM_{10} emission limit of 74 lb/hr at Huntington Unit 1; and a PM emission limit of 70 lb/hr at Huntington Unit 2. The pound per hour emission limit for the Huntington units was based on a 0.015 lb/MMBtu emission rate and a maximum hourly heat input.

Because the most stringent technology is in place and the SIP contains a federally enforceable emission limit for PM of 0.015 lb/MMBtu, no further analysis is required[6,7,8].

IV. Alternative to BART for NOx

40 CFR 51.308(e)(2) A State may opt to implement or require participation in an emissions trading program or other alternative measure rather than to require sources subject to BART to install, operate, and maintain BART. Such an emissions trading program or other alternative measure must achieve greater reasonable progress than would be achieved through the installation and operation of BART. For all such emission trading programs or other alternative measures, the State must submit an implementation plan containing the following plan elements and include documentation for all required analyses:

Utah has opted to establish an alternative measure for NOx as provided in 40 CFR 51.308(e)(2).[9] The alternative measure requires the installation of low-NOx burners with overfire air with an emission limit

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[6] In Colorado, with regard to similar electric generating units (EGU), EPA explained that "[f]abric filter baghouses are the most stringent control technology for controlling PM emissions." 77 Fed. Reg. 18,052, 18,066 (Mar. 26, 2012). EPA further explained, "consistent with the BART Guidelines, the State did not provide a full five-factor analysis because the State determined BART to be the most stringent control technology and limit" and "assumes the BART limit can be met with the operation of the existing fabric filter baghouses." *Id.* Significantly, EPA concluded that it "agree[d] with the State's conclusions and we are proposing to approve its PM BART determinations." *Id.*

[7] In Wyoming, EPA approved the State's conclusions that "fabric filters represent the most stringent PM control technology" and that "[c]onsistent with the BART Guidelines, the State did not provide a five-factor analysis because the State determined BART to be the most stringent control technology and limit." 77 Fed. Reg. 33,022, 33,035. (*citing* 70 Fed. Reg. at 39,165 (Appx. Y)). EPA also has approved or proposed to approve in numerous other actions, including Wyoming, the same 0.015 lb/MMBtu PM BART emissions limit adopted in the prior Utah RH SIP and in this SIP Revision. *See, e.g.*, 79 Fed. Reg. 5,032, 5,220. *See also* EPA's approval of PM BART in Arizona (77 Fed. Reg. at 72,523 (December 5, 2012)) and for the Four Corners Power Plant (77 Fed. Reg. 51, 620, 51, 636 (August 24, 2012)).

[8] In other actions, EPA has approved PM BART limits that are twice as high as those included for the Units in the SIP Revision. For example, EPA approved a RH SIP with a PM BART emissions limit of 0.03 lb/MMBtu for nine EGUs in Colorado. *See, e.g.*, 77 Fed. Reg. 18,051,18,066 (Mar. 26, 2012); 77 Fed. Reg. at 76,872 . EPA approved PM BART emissions limits of 0.03 and 0.04 lb/MMBtu for certain EGUs in Wyoming, where the most stringent limit was 0.015 lb/MMBtu. 79 Fed. Reg. at 5,220. EPA also approved PM limits of 0.07 lb/MMBtu for four EGUs in North Dakota. 76 Fed. Reg. at 58,585; 77 Fed. Reg. at 20,930. In addition, EPA also adopted a PM limit of 0.26 lb/MMBtu for Corette in its FIP for Montana. 77 Fed. Reg. at 57,911.

[9] Greater reasonable progress can be demonstrated using one of two methods: (i) "greater emission reductions" than under BART (40 C.F.R. §51.308(e)(3)); or (ii) "based on the clear weight of evidence" (40 C.F.R. §51.308(e)(2)(E)). As the U.S. Circuit Court of Appeals for the 10th Circuit recently observed, the state is free to choose one method or the other. *WildEarth Guardians v. E.P.A.*, 770 F.3d 919, 935-37 (10th Cir. 2014). The court characterized the former approach as a "quantitative" and the later as "qualitative," and specifically sanctioned the use of qualitative factors under the clear weight of evidence.

more stringent than the presumptive BART emission limit at the four EGUs that are subject-to-BART, and additional reductions of visibility impairing pollutants from three EGUs that are not subject to BART: PacifiCorp Hunter Unit 3, PacifiCorp Carbon Unit 1, and PacifiCorp Carbon Unit 2.

> **PacifiCorp Hunter Units 1 and 2 and PacifiCorp Huntington Units 1 and 2:** the replacement of first generation low-NO_x burners with Alstom TSF 2000TM low-NO_x firing system and installation of two elevations of separated overfire air.
>
> **PacifiCorp Hunter Unit 3** (not subject-to-BART): the replacement of first generation low-NOx burners with upgraded low-NOx burners with overfire air.
>
> **PacifiCorp Carbon Units 1 and 2** (not subject-to-BART): permanent closure of both units by August 15, 2015 and rescission of the plant's operating permit by December 31, 2015.

PacifiCorp has announced plans to shut down the Carbon Power Plant in 2015[10] due to the high cost to control mercury to meet the requirements of EPA's Mecury and Air Toxics Standards (MATS). The MATS rule was finalized in 2011, well after the 2002 base year for Utah's RH SIP, and therefore any reductions required to meet the MATS rule may be considered as part of an alternative strategy under 40 CFR 51.308(e)(2)(vi). This plant is located about 30 miles northeast of the Huntington Plant and about 40 miles northeast of the Hunter Plant and its emissions impact the same general area as the Hunter and Huntington Plants. Average SO_2 emissions from the Carbon Plant in 2012-13 were 8,005 tons/yr, and average NOx emissions were 3,342 tons /yr. PacifiCorp and ultimately Utah rate payers must pay the cost to replace the electricity generated by this plant, but there will also be a visibility benefit due to the emission reductions. Overall emission reductions of SO_2 and NOx due to the closure of this plant will be greater than the NOx reductions that could be achieved by installing the most stringent NOx control, SCR, on the four subject-to-BART EGUs and the emission reductions will occur close to the location of the Hunter and Huntington plants.

While PacifiCorp has announced plans to shut down the Carbon Plant, this decision is not enforceable, and PacifiCorp could choose to meet the MATS requirements through other measures. On November 25, 2014, the Supreme Court agreed to consider challenges to the MATS rule, so there is a possibility that the mercury control requirements could be overturned or delayed. An enforceable requirement in the RH SIP to permanently close the Carbon Plant as part of an alternative to BART would lock in substantial emission reductions.

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[10] "PacifiCorp continues to plan for retirement of its Carbon facility in early 2015 as the least-cost alternative to comply with MATS and other environmental regulations. Implementation of the transmission system modifications necessary to maintain system reliability following disconnection of the Carbon facility generators from the grid are underway." 2013 Integrated Resource Plan Update Redacted, PacifiCorp, March 21, 2014, page 16.

V. BART-eligible Sources Covered by Alternative Measure for NOx

40 CFR 51.308(e)(2)(i)(A) A list of all BART-eligible sources within the state.
40 CFR 51.308(e)(2)(i)(B) A list of all BART-eligible sources and all BART source categories covered by the alternative program. The state is not required to include every BART source category or every BART-eligible source with a BART source category in an alternative program, but each BART-eligible source in the state must be subject to the requirements of the alternative program, have a federally enforceable emission limitation determined by the state and approved by EPA as meeting BART in accordance with section 302(c) or paragraph (e)(1) of this section, or otherwise addressed under paragraphs (e)(1) or (e)(4) of this section.

Four EGUs were the only BART-eligible sources identified in Utah's 2008 RH SIP. All four of these EGUs are covered by the alternative program.

- PacifiCorp Hunter, Unit 1
- PacifiCorp Hunter, Unit 2
- PacifiCorp Huntington, Unit 1
- PacifiCorp Huntington, Unit 2

The Alternative Measure includes "non-BART sources" (i.e., Carbon Unit 1 and Unit 2 (PM, NOx and SO_2) and Hunter Unit 3 (NOx)). The Tenth Circuit Court recognized non-BART sources as a legitimate factor to consider in a "weight of the evidence" analysis. *WildEarth Guardians v. E.P.A.*, 770 F.3d 919, 935-36 (10th Cir. 2014).

VI. NOx emission reductions achievable

40 CFR 51.308(e)(2)(i)(C) An analysis of the best system of continuous emission control technology available and associated emission reductions achievable for each source within the state subject to BART and covered by the alternative program. This analysis must be conducted by making a determination of BART for each source subject to BART and covered by the alternative program as provided for in paragraph (e)(1) of this section, unless the emissions trading program or other alternative measure has been designed to meet a requirement other than BART (such as the core requirement to have a long-term strategy to achieve the reasonable progress goals established by the states). In this case, the state may determine the best system of continuous emission control technology and associated emission reductions for similar types of sources within a source category based on both source-specific and category-wide information, as appropriate.

In June 2012, PacifiCorp prepared a new 5-factor BART analysis to satisfy the requirements of the BART rule. PacifiCorp submitted an update to that analysis on August 5, 2014 to address issues that EPA had raised with other regional haze SIPs. The technologies identified in the analysis range from the currently required low NOx burners with overfire air (presumptive BART) to the most-stringent NOx technology (SCR + low NOx burners with overfire air). DAQ reviewed PacifiCorp's analysis and agreed that SCR + low NOx burners with overfire air with an annual emission rate of 0.05 lb/MMBtu was the most stringent technology available to reduce NOx emissions from the four subject-to-BART EGUs.[11] This technology is very expensive to install on the subject-to-BART EGUs considering their current configuration and the unique characteristics of Utah's coal and would require careful consideration through a case-by-case 5-factor analysis before determining if it was cost effective. However, this technology can be used as a stringent benchmark for comparison with an alternative program. DAQ's use of this technology as a benchmark is not a determination that this technology is BART, it is merely a conservative approach to evaluate the effectiveness of the alternative program (see Table 2).

[11] EPA has used a 0.05 lb/MMBtu NOx emissions rate for SCR for other regional haze SIP analyses, recently in New Mexico and Arizona. *See e.g.*, 79 Fed. Reg. 60,978, 60, 984 (New Mexico, Oct. 9 2014)("In promulgating the FIP, we evaluated the performance of both new and retrofit SCRs and determined that 0.05 lb/MMBtu on a 30-boiler-operating-day average was the appropriate emission limit for SCR at the San Juan Generating Station units. See 76 FR 491 and 76 FR 52388. New Mexico appropriately used this same rate in their cost and visibility analyses for the four-SCR scenario as part of its BART evaluation."); 79 Fed. Reg. 52,420, 52,431 (Arizona, Sept. 3, 2014)("We agree that our use of a 0.05 lb/MMBtu annual average design value for SCR is consistent with other BART determinations for coal-fired power plants."). EPA has agreed that even higher NOx emission rates can qualify as the most stringent emission rate for modeling visibility impacts. For example, EPA accepted state-mandated SCR emission rates of 0.07 and 0.08 in Colorado, as well as its SCR related analyses based on 0.07. 77 Fed. Reg. 76,871 (Colorado, Dec. 21, 2012). EPA also used 0.083 to 0.098 for the Reid Gardner Station in Nevada. 77 Fed. Reg. 50,936, 50,942 (Nevada, Aug. 23, 2012).

VII. Projected Emission Reductions from Alternative Measures

40 CFR 51.308(e)(2)(i)(D) An analysis of the projected emissions reductions achievable through the trading program or other alternative measure.

Table 2 shows the estimated annual emissions for NOx, SO_2, and PM_{10} for the most stringent NOx scenario and the alternative measure. As can be seen, NOx emissions are higher under the alternative measure, but emissions of SO_2 and PM_{10} are both lower under the alternative measure. Combined emissions of all three pollutants are 2,856 tons/yr lower under the alternative measure.[12]

Table 2. Estimated emissions under the most stringent NOx scenario and the alternative scenario

Units	NOx emissions (tons/yr)		SO_2 emissions (tons/yr)		PM_{10} emissions (tons/yr)[d]		Combined	
	Most Stringent NOx[b]	Alternative[c]	Most Stringent NOx[b]	Alternative[c]	Most Stringent NOx	Alternative	Most Stringent NOx	Alternative
Carbon 1	1,408	0	3,388	0	221	0	5,016	0
Carbon 2	1,940	0	4,617	0	352	0	6,909	0
Hunter 1[a]	775	3,412	1,529	1,529	169	169	2,473	5,100
Hunter 2	843	3,412	1,529	1,529	169	169	2,541	5,110
Hunter 3	6,530	4,622	1,033	1,033	122	122	7,685	5,777
Huntington	809	3,593	1,168	1,168	176	176	2,153	4,937
Huntington	856	3,844	1,187	1,187	200	200	2,243	5,231
Total	13,161	18,882	14,451	6,446	1409	836	29,020	26,164

[a] Hunter 1 controls were installed in the spring of 2014, therefore Hunter 2 actual emissions are used as a surrogate

[b] Most stringent NOx rate for BART-eligible units (see spreadsheet BART Analysis.pdf in the TSD), 2012-13 actual emissions Carbon, 2001-3 actual emissions Hunter 3 (EPA Acid Rain Program)

[c] Average actual emissions 2012-13 for Hunter and Huntington units, EPA Acid Rain Program

[d] Actual emissions for 2012, DAQ annual inventory

[12] EPA has approved, or proposed approval, of other BART Alternatives that included "inter-pollutant trading" when SO_2 levels were lowered. 79 Fed. Reg. 33,438, 33,440-41 (Washington, June 11, 2014); 79 Fed. Reg. 56,322, 56,328 (Arizona, Sept. 19, 2014).

VIII. Greater Reasonable Progress than BART

40 CFR 51.308(e)(2)(i) Demonstration that the emissions trading program or other alternative measure will achieve greater reasonable progress than would have resulted from the installation and operation of BART at all sources subject to BART in the state and covered by the alternative program.

40 CFR 51.308(e)(2)(i)(E) A determination under paragraph (e)(3) if this section or otherwise based on the clear weight of evidence that the trading program or other alternative measure achieves greater reasonable progress than would be achieved through the installation and operation of BART at the covered sources.

EPA described the clear weight of evidence standard as follows: "Weight of evidence" demonstrations attempt to make use of all available information and data which can inform a decision while recognizing the relative strengths and weaknesses of that information in arriving at the soundest decision possible. Factors which can be used in a weight of evidence determination in this context may include, but not be limited to, future projected emissions levels under the program as compared to under BART, future projected visibility conditions under the two scenarios, the geographic distribution of sources likely to reduce or increase emissions under the program as compared to BART sources, monitoring data and emissions inventories, and sensitivity analyses of any models used. (Emphasis added.) See 71 Fed. Reg. 60,612, 60,622 (Oct. 13, 2006).[13]

The weight of evidence shows that the alternative program will provide greater reasonable progress than BART. The DAQ used a number of different metrics to reach this conclusion. First, as outlined in section VI, combined emissions of NOx, SO_2, and PM will be 2,856 tons/yr lower under the alternative scenario. The NOx reductions at Huntington 1 and 2 and Hunter 2 and 3 occurred between 2006 and 2011, earlier than was required by the rule, providing a corresponding early and on-going visibility improvement[14]. Second, as outlined in section VIII.A, the alternative provides greater reductions of SO_2, the most significant anthropogenic pollutant affecting Class I Areas on the Colorado Plateau that affects visibility year-round, including the high visitation seasons of Spring, Summer, and Fall. Finally, as outlined in section VIII.B, visibility modeling shows that the alternative will provide greater visibility improvement.

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[13] EPA recently confirmed the availability of the "other alternative measure" based on the "clear weight of evidence" approach in approving a "BART Alternative" under the Arizona regional haze state implementation plan. 80 Fed. Reg. 19220 (April 10, 2015).

[14] The U.S. Circuit Court of Appeals for the 10th Circuit explicitly acknowledged that the consideration of early reductions was proper as part of a qualitative or clear weight of evidence approach to determining greater reasonable progress. WildEarth Guardians v. E.P.A., 770 F.3d 919, 938 (10th Cir. 2014).

DAQ conducted dispersion modeling using the CALPUFF model to compare the visibility improvement anticipated under the alternative measure with the visibility improvement under the most stringent NOx technology for the four subject-to-BART EGUs. The seven EGUs shown in Table 3 were included in the modeling. Detailed information regarding the modeling inputs, emission scenarios, and methods are described in the February 13, 2014 modeling protocol.[15]

Table 3. Emission units and Class I areas modeled

Company Name	Plant Name	Units
PacifiCorp	Hunter	Boilers #1,2,3
PacifiCorp	Huntington	Boilers #1,2
PacifiCorp	Carbon	Boilers #1,2

Source	Class I Areas to be Evaluated
PacifiCorp Hunter Plant, PacifiCorp Huntington Plant, PacifiCorp Carbon Plant	Arches National Park, Canyonlands National Park, Capitol Reef National Park, Bryce National Park, Zion National Park, Mesa Verde National Park, Black Canyon of the Gunnison National Park, Grand Canyon National Park, Flat Tops Wilderness

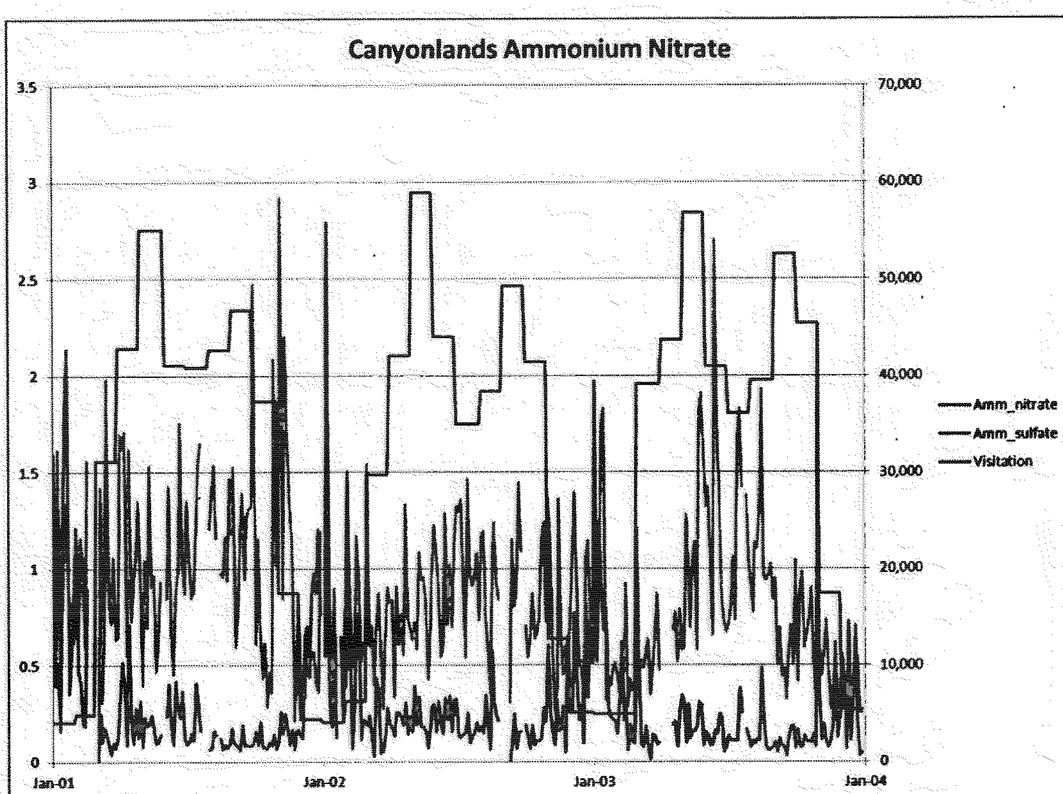
Because the emission reductions under the alternative included reductions of SO_2 in addition to reductions of NOx, visibility improvement under the two scenarios could occur during different episodes and during different times of the year. For this reason, a number of different metrics were evaluated to compare the two scenarios.

A. Continued Focus on SO_2 Reductions

Utah's 2003 RH SIP focused on SO_2 reductions because SO_2 has the greatest overall impact at Class I areas on the Colorado Plateau and revisions in 2008 and 2011 continued this focus. The alternative measures enhance that approach through additional, significant emission reductions of over 8,000 tons/yr SO_2 due to the closure of the Carbon Plant. Figure 1 shows that sulfates are the dominant visibility impairing pollutant at Canyonlands, the Class I area with the greatest overall impact from the four subject-to-BART sources. Figure 4 shows that sulfates affect visibility throughout the year and are the dominant visibility impairing pollutant from anthropogenic sources during the high visitation period of March through November. Similar results are seen at the other Class I areas and are documented in the TSD.

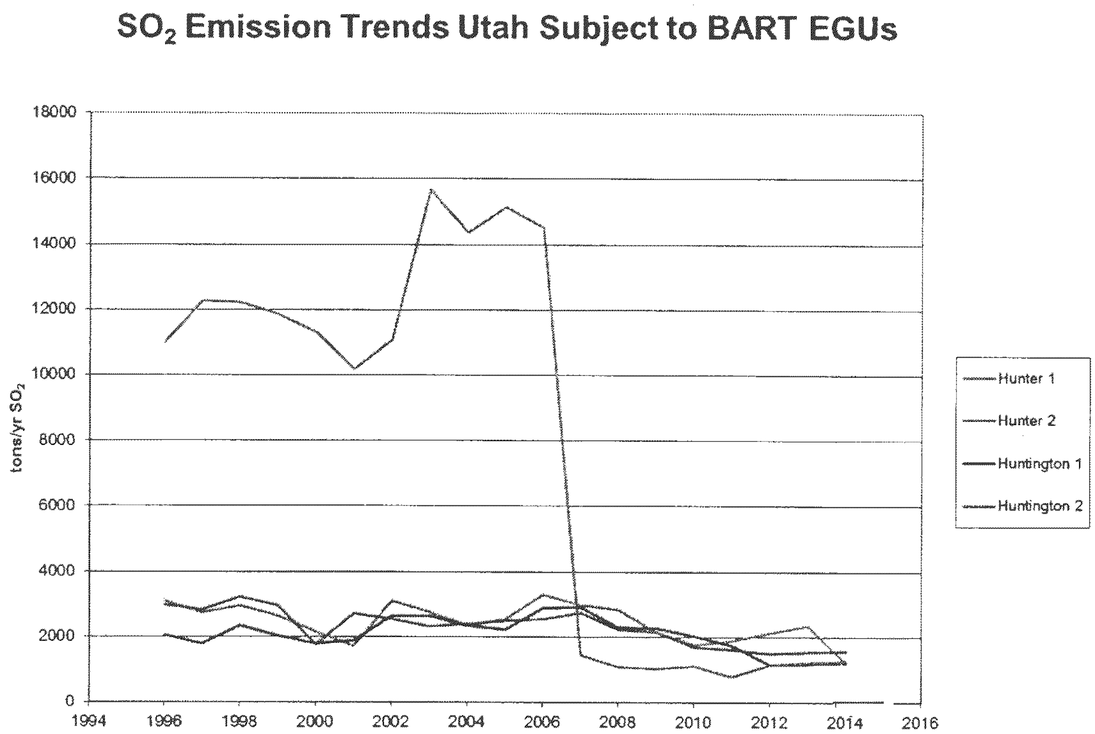
[15] Air Quality Modeling Protocol: Utah Regional Haze State Implementation Plan, Utah Division of Air Quality, February 13, 2015

Figure 4. Canyonlands ammonium sulfate and ammonium nitrate



DAQ has confidence that SO_2 reductions will achieve meaningful visibility improvement. The visibility improvement during the winter months due to NOx reductions is much more uncertain. Figure 5 shows the significant emission reductions of both SO_2 and NOx that have occurred from the four subject-to-BART EGUs over the last 15 years. Figure 6 shows corresponding improvements in ammonium sulfate values at Canyonlands throughout the year. However, ammonium nitrate values do not show similar improvement in the winter months, despite a 50% reduction in NOx over this time period.

Figure 5. SO_2 and NOx Emission Trends



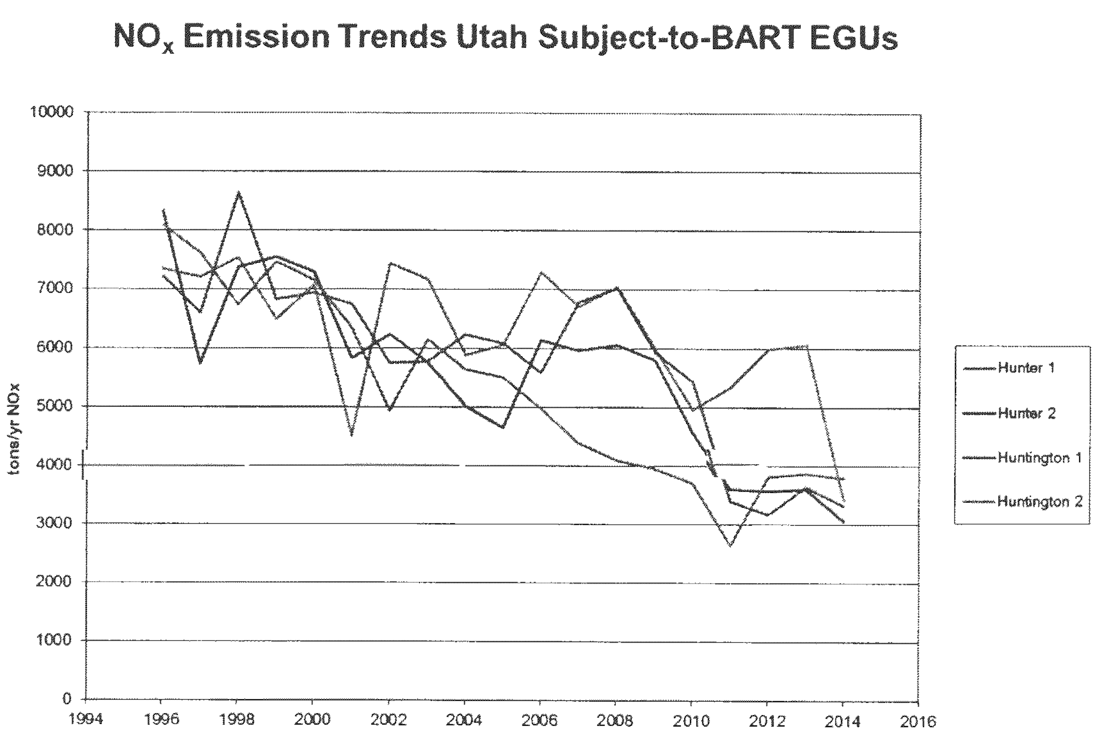
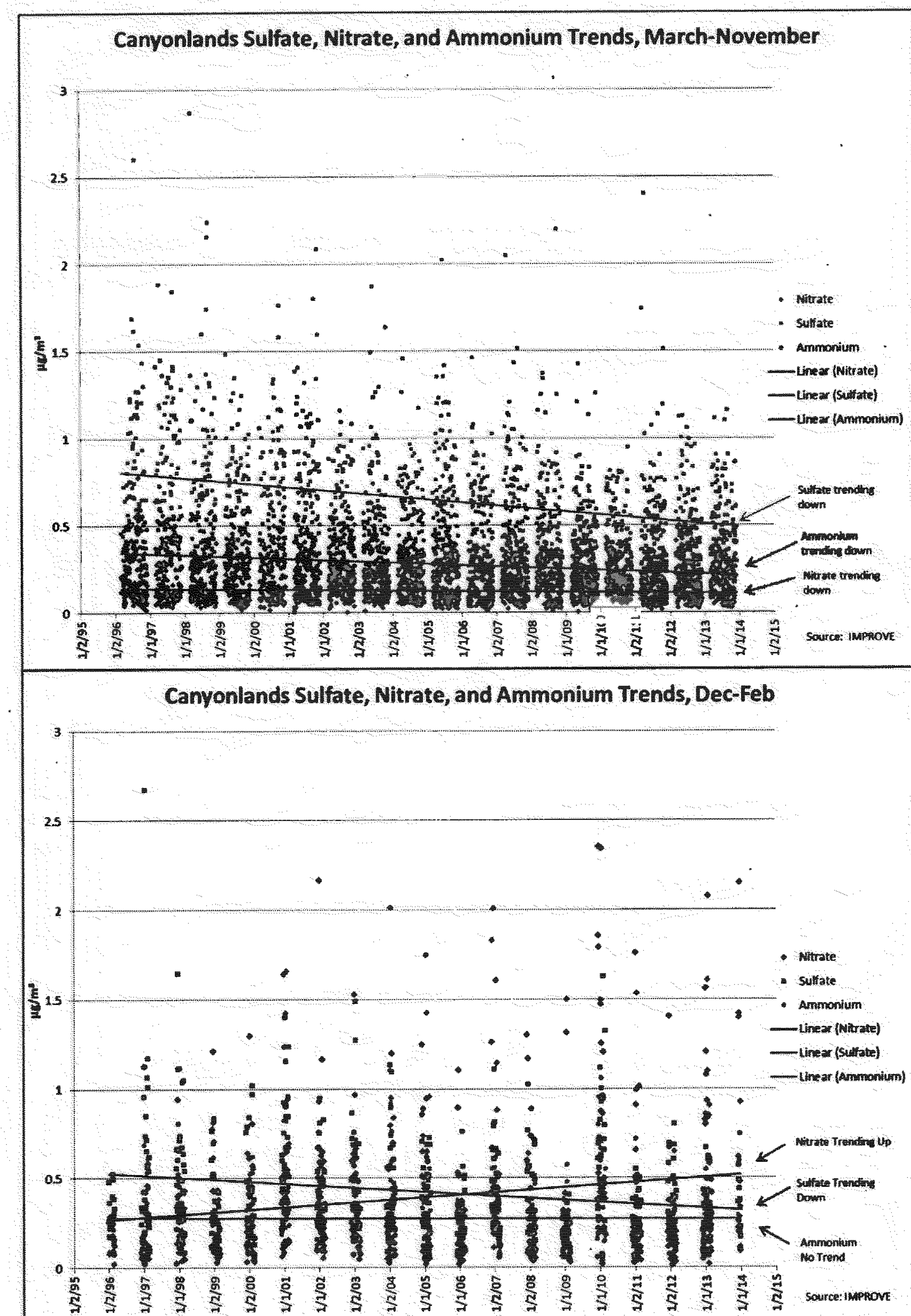
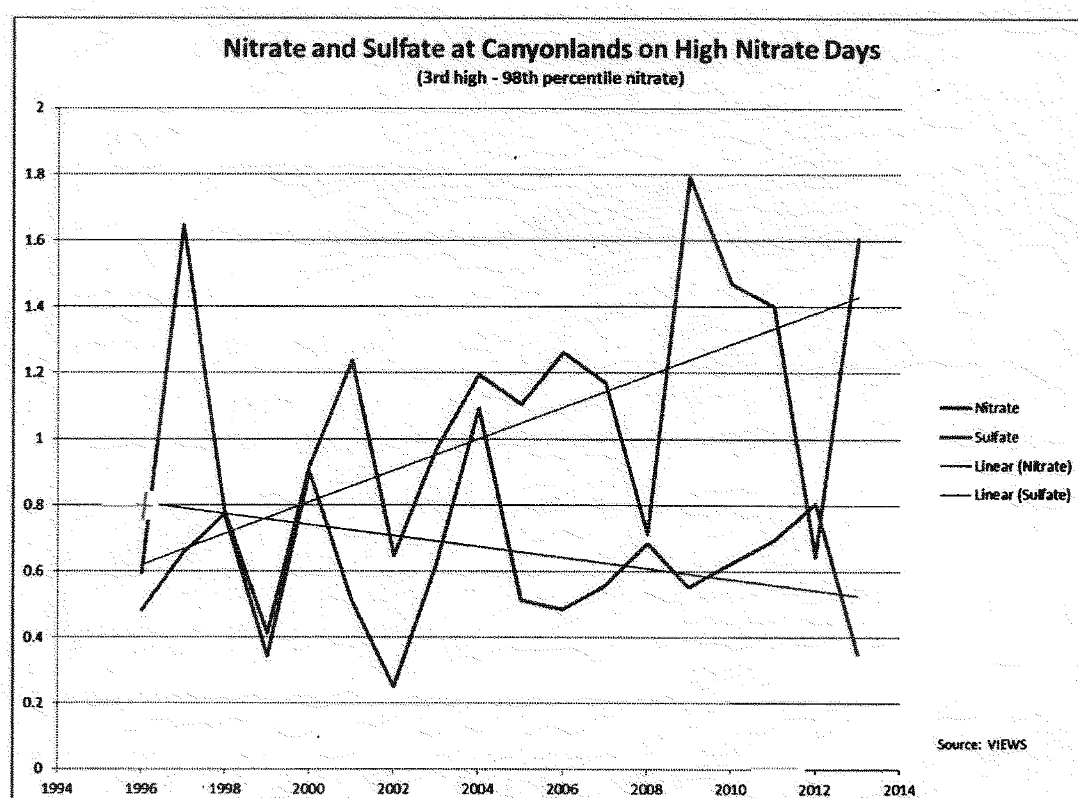


Figure 6. Sulfate and Nitrate Trends at Canyonlands



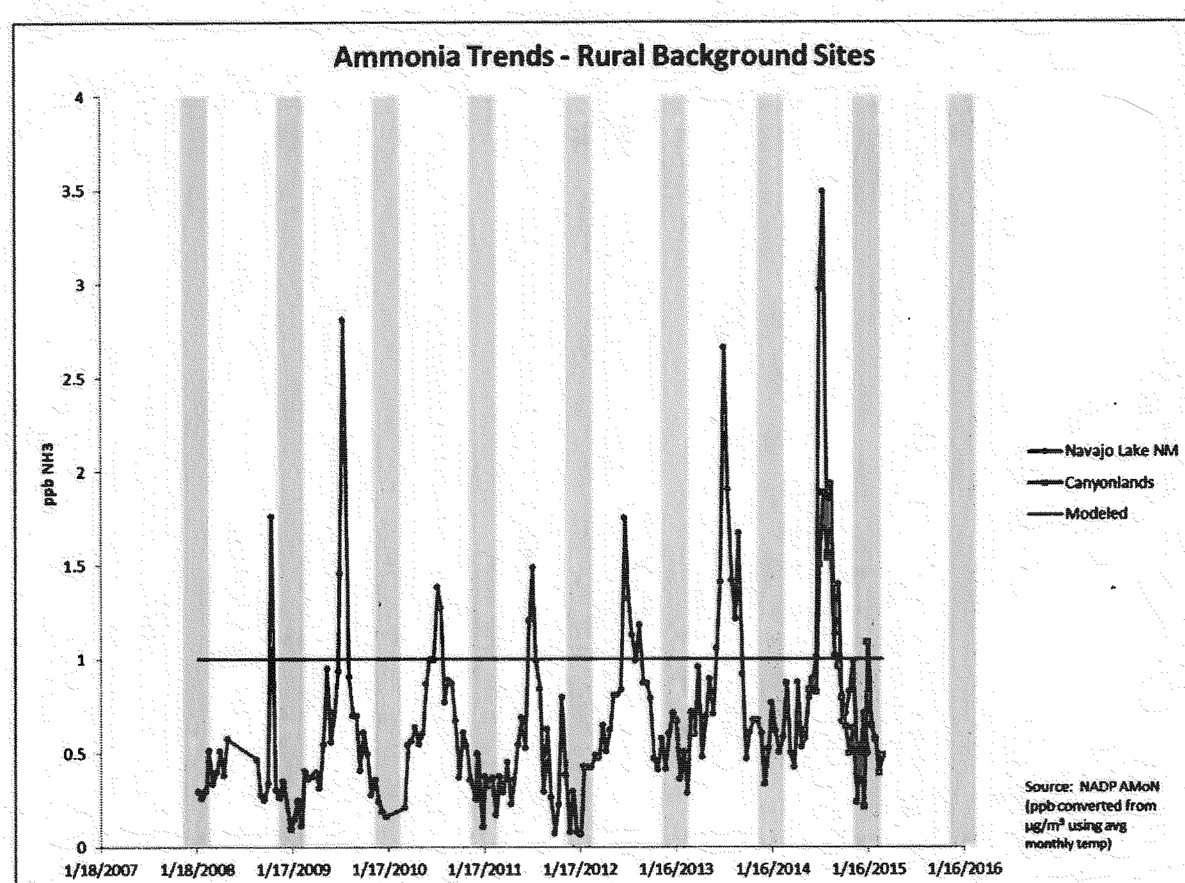
The explanation for the lack of improvement in winter nitrate levels may lie in the chemical reactions that lead to the formation of ammonium sulfate and ammonium nitrate. Ammonium sulfate forms more readily than ammonium nitrate when both SO_2 and NOx are available to react with ammonia. As SO_2 emissions decline and SO_2 is no longer available, the reaction shifts to form ammonium nitrate from available NOx. Figure 7 shows the nitrate and sulfate mass on the 98th percentile (3rd high) nitrate day showing the possible shift from formation of sulfate to nitrate. Figure 6 on the previous page shows that the decreases in sulfate are offset by increases in nitrate during the winter while ammonium levels show little change. This would make sense if ammonia is limiting the reaction because two molecules of ammonium nitrate (NH4)NO3 would be created for every molecule of ammonium sulfate (NH4)2SO4 that was decreased. During the summer sulfate, nitrate, and ammonium are all decreasing, indicating that ammonia is not limiting the reaction.

Figure 7. Nitrate and Sulfate on High Nitrate Days



The overall result is that emission reductions may not lead to visibility improvement in the winter because there is not enough ammonia available to react with all of the SO2 and NOx available in the area. Figure 8 shows ammonia monitoring data from Canyonlands National Park and Navajo Lake in New Mexico. Ammonia levels at these two sites are very low during the winter.

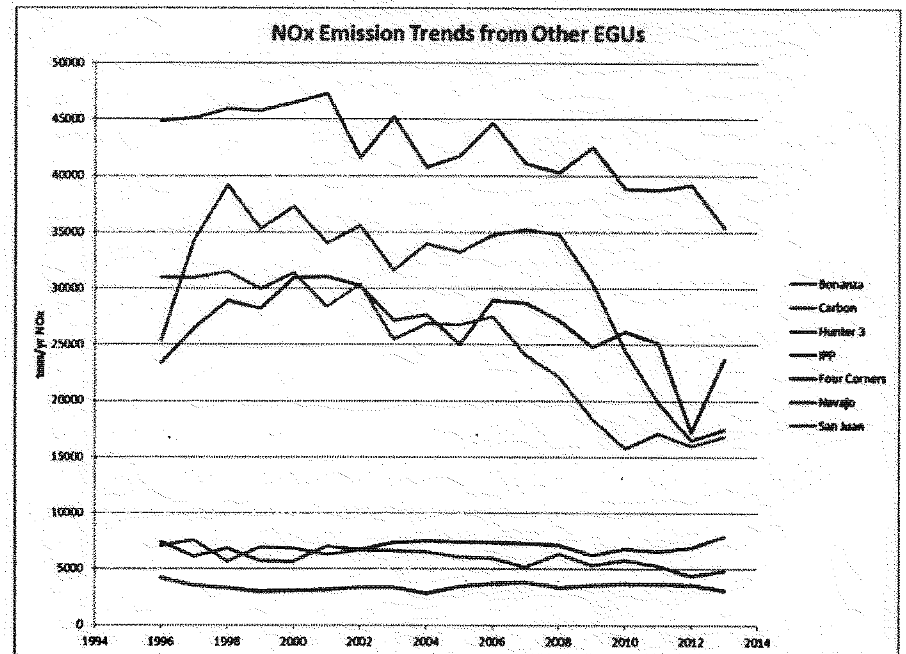
Figure 8. Ammonia Trends at Rural Background Sites



Ammonium nitrate levels are low most of the year and are only significant during the winter months (see figure4) so if NOx emission reductions do not lead to visibility improvements in the winter the overall effect may not be a great as expected. Ammonium sulfate, on the other hand, is an issue year round. For this reason, DAQ has greater confidence that modeled improvements due to reductions in SO_2 will be reflected in improved visibility for visitors to the Class I areas, while reductions in NOx will have a more uncertain benefit.

DAQ also considered the effect of changes in NOx emission from other sources in the region as a possible explanation for the increase in ammonium nitrate levels. Figure 9 shows that NOx emissions are decreasing at other EGUs in the area. Mobile source NOx emissions are decreasing nationwide due to implementation of the Tier 1 and Tier 2 emission standards and should continue to be reduced through the implementation of Tier 3 emission standards.

Figure 9. NOx Emission Trends from EGUs



Oil and gas NOx emissions in the surrounding basins may be increasing as shown in Table 4, but the overall scale of the emission increase is small when compared to the decrease in emissions from EGUs and mobile sources in the region.

Table 4. NOx Emissions from the Oil and Gas Industry

Oil and Gas Inventory

	2006	2012	Change
Uinta Basin	13,093	19,801	6,708
Northern San Juan	5,700	4,195	(1,505)
Southern San Juan	42,075	43,050	975
Piceance	12,390	9,951	(2,439)
Total	73,258	73,747	3,739

Source: WRAP Phase III Inventory 2012 projection. Uinta Basin – 2011 NEI inventory area sources and state permitted, WRAP 2012 Indian Country permitted.

The largest increase in NOx emissions is occurring in the Uinta Basin, located to the north of Utah's Class I areas. It is worth noting that during the winter months when ammonium nitrate levels are increasing at Canyonlands, a significant portion of the Uinta Basin emissions are trapped under a tight inversion layer throughout much of the winter. Extensive research through the multi -year Uinta Basin Ozone Study (UBOS) has indicated that there is little exchange between the air below and above the inversion layer when an inversion is in place. The emissions are transported out of the Uinta Basin during significant storm events that break up the inversion. These storm events affect the entire region and are unlikely to transport emissions to nearby Class I areas. The DAQ is currently working with EPA, the Ute Tribe, and producers in the Uinta Basin to improve the oil and gas inventory.

The fact that ammonium nitrate levels are decreasing during most of the year, but are increasing during the winter is the best indication that the increase in ammonium nitrate is not due to changes in emissions because the emission changes are not seasonal. If emissions were increasing, the effect should be seen year round.

B. Comparison of Modeled Results

The visibility modeling demonstrated greater visibility improvement across all Class I areas. The results of this modeling are described in sections VIII.B.1 through 4. The detailed modeling results are included in the TSD.[16]

1. Improvement in number of days with significant visibility impairment.

Modeled visibility improved more often under the alternative scenario leading to an average of six fewer days with a deciview impact greater than 1.0 dV per year and 58 fewer days with a deciview impact greater than 0.5 dV per year. The number of days improved is shown using two different methodologies. The first, shown in Tables 5 and 6, shows the 3-year average number of days at each Class I area with an impact of greater than 1.0 dv and 0.5 dv. The 3-year average is then totaled for all Class I areas to show the total number of days across all Class I areas /year.

Table 5. Average Number of Days > 1.0 dV Impact

	Basecase	Alternative	Most Stringent NOx Control
Arches	128	68	77
Black Canyon of the Gunnison	36	10	9
Bryce Canyon	19	9	8
Canyonlands	141	87	87
Capitol Reef	68	42	41
Flat Tops	46	13	15
Grand Canyon	22	11	[illegible]
Mesa Verde	40	13	12
Zion	11	6	6
Total	511	258	264

[16] Technical Support Document for Regional Haze SIP

Table 6. Average Number of Days > 0.5 dV Impact

	Basecase	Alternative	Most Stringent NOx Control
Arches	176	109	130
Black Canyon of the Gunnison	75	27	34
Bryce Canyon	36	17	19
Canyonlands	178	131	140
Capitol Reef	96	63	65
Flat Tops	93	34	44
Grand Canyon	38	19	20
Mesa Verde	71	32	37
Zion	21	10	10
Total	784	441	499

The second methodology focuses on the improvement rather than the results. In this case the improvement in visibility from the baseline for each scenario was calculated for each day in the 3-year period. The number of days was then totaled across all Class I areas showing the total days across the 3-year period. Tables 7 and 8 show the number of days improved by ≥ 1.0 dV and ≥ 0.5 dV across the 3-year period.

Table 7. Number of Days that Improved 1.0 dV impact (across all 3 years)

	Alternative	Most Stringent NOx Control
Arches	246	222
Black Canyon	51	43
Bryce Canyon	27	28
Canyonlands	258	259
Capitol Reef	138	127
Flat Tops	53	51
Grand Canyon	33	35
Mesa Verde	51	53
Zion	18	19
Total	885	837

Table 8. Number of Days that Improved > 0.5 dV impact (across all 3 years)

	Alternative	Most Stringent NOx Control
Arches	433	378
Black Canyon	138	116
Bryce Canyon	66	62
Canyonlands	443	419
Capitol Reef	215	212
Flat Tops	181	144
Grand Canyon	78	78
Mesa Verde	138	132
Zion	37	34
Total	1729	1575

The results are presented in more detail in Figures 10-12 for the three most impacted Class I areas, Canyonlands, Arches, and Capitol Reef. Similar figures for the other Class I areas are included in the TSD. The groupings showing dV improvement of 3 or greater are almost all days during the winter months of December – February. The largest number of days improved are found in the 1 dV group and the .5 dV group and contain days throughout the year, including the high visitation period of March – November.

Figure 10. Days Improved at Canyonlands

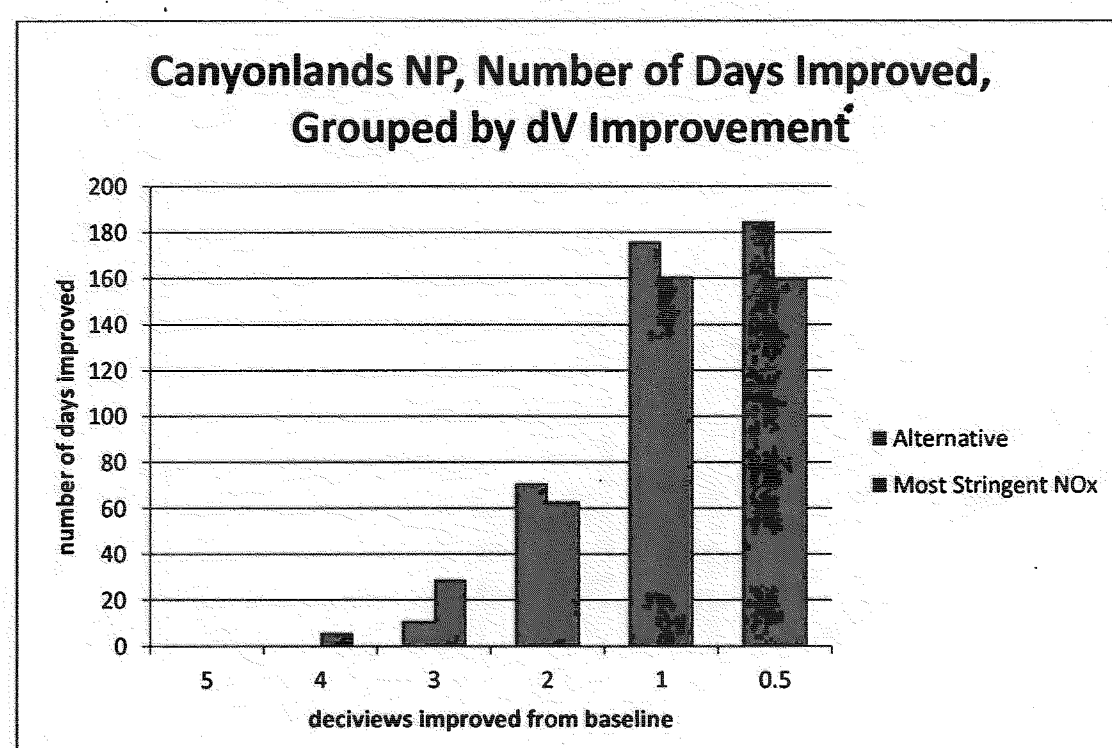


Figure 11. Days Improved at Arches

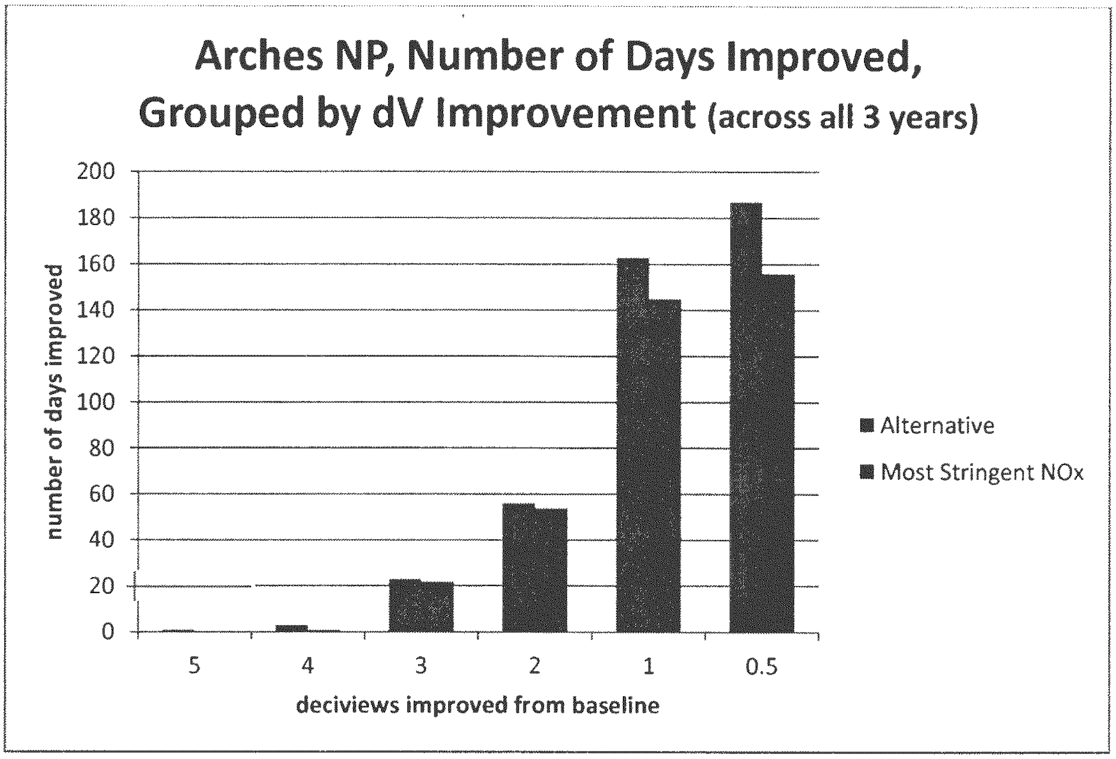
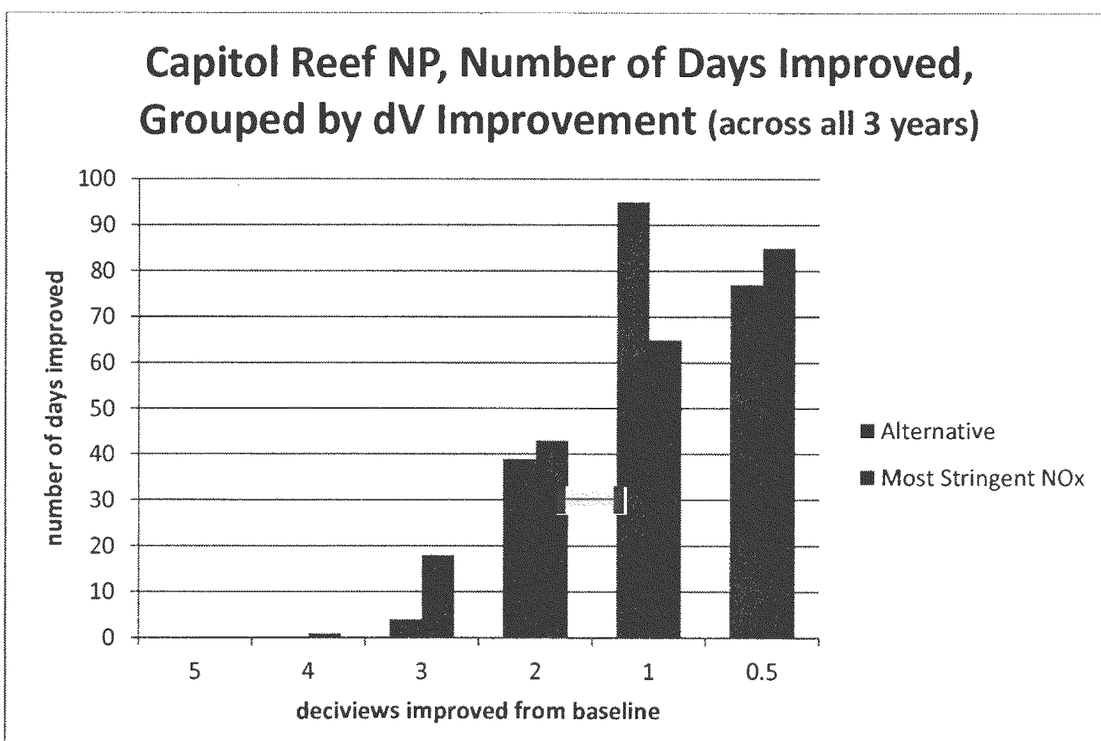


Figure 12. Days Improved at Capitol Reef



2. Average deciview impact

The average deciview impact at all Class I areas is better or the same under the alternative at six of the nine Class I areas, and is better on average across all the Class I areas. The average impact was calculated by averaging all modeling results for each year and then calculating a 3-year average from the annual average. The average deciview metric shows the benefit that will be achieved day in and day out in the Class I areas. This information is valuable as part of the overall weight of evidence because reductions in SO_2 and reductions in NOx improve visibility at different times of year and at different Class I areas. Ammonium sulfate is an issue year round while ammonium nitrate is primarily an issue in the winter. This means that the benefits of SO_2 reductions are more apparent when looking at longer averaging periods while the benefits of NOx reductions are more apparent when looking at the worst days. The average monitoring data shown earlier in this document in Figure 1 illustrates this difference. As can be seen in the figure, ammonium sulfate is the most significant visibility impairing pollutant on average. As explained in Section VIII.A, the DAQ has less confidence in the modeled results in the winter when the worst days occur because emission reductions have not led to the expected improvements during that time period.

Table 9. Average ΔdV across all Class I Areas

	Basecase	Alternative	Most Stringent NOx
Arches	1.236	0.616	0.688
Black Canyon of the Gunnison	0.334	0.137	0.158
Bryce Canyon	0.192	0.089	0.090
Canyonlands	1.389	0.791	0.760
Capitol Reef	0.719	0.398	0.367
Flat Tops	0.427	0.167	0.210
Grand Canyon	0.211	0.102	0.100
Mesa Verde	0.338	0.148	0.154
Zion	0.119	0.056	0.056
Average	0.552	0.278	0.287

3. 90th percentile deciview impact

The 90th percentile deciview impact is better or the same under the alternative at seven of the nine Class I areas, and is slightly better on average across all Class I areas. This metric shows that even on higher impact days the benefits of the alternative are comparable to the most stringent NOx scenario. Ammonium sulfate affects visibility year round and also impacts visibility on days with greater impairment. The alternative scenario that contains greater SO_2 reductions achieves comparable results to the most stringent NOx scenario that contains greater NOx reductions on these impaired days.

Table 10. 90th Percentile (110th highest) across all 3 years

	Basecase	Alternative	Most Stringent NOx
Arches	3.721	1.859	1.999
Black Canyon of the Gunnison	0.977	0.400	0.465
Bryce Canyon	0.495	0.189	0.227
Canyonlands	4.183	2.447	2.148
Capitol Reef	2.416	1.234	1.150
Flat Tops	1.221	0.466	0.555
Grand Canyon	0.559	0.222	0.241
Mesa Verde	1.124	0.430	0.501
Zion	0.183	0.067	0.089
Average	1.653	0.813	0.819

4. 98th percentile deciview impact

The only metric evaluated that showed greater improvement under the most stringent NOx scenario was the visibility impact on the most impaired days. Because high nitrate values occur primarily in the winter months, the most stringent NOx scenario achieved greater modeled visibility improvement on these high nitrate days. As discussed earlier, there is greater uncertainty regarding the effect of NOx reductions on wintertime nitrate values because past emission reductions have not resulted in corresponding reductions in monitored nitrate values during the winter months. DAQ has greater confidence in the visibility improvement due to reductions of SO_2 because past reductions have resulted in corresponding reductions in monitored sulfate values throughout the year.

Table 11. Average 98th Percentile (22nd High) Across 3 Years

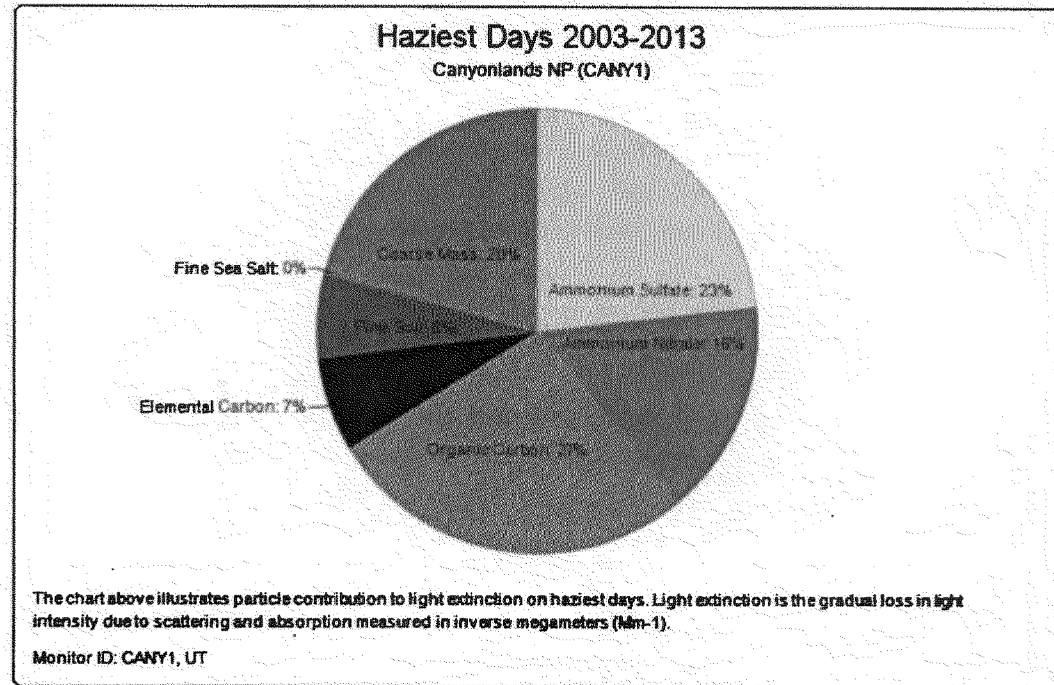
	Basecase	Alternative	Most Stringent NOx
Arches	7.25	4.43	4.57
Black Canyon of the Gunnison	2.40	1.16	1.07
Bryce Canyon	2.47	1.24	1.14
Canyonlands	8.43	6.08	5.14
Capitol Reef	6.53	4.26	3.76
Flat Tops	2.80	1.27	1.33
Grand Canyon	2.90	1.49	1.33
Mesa Verde	2.91	1.39	1.29
Zion	1.50	0.74	0.73
Average	**4.13**	**2.45**	**2.26**

Table 12. 98th Percentile (8th High) in Highest Year

	Basecase	Alternative	Most Stringent NOx
Arches	7.80	4.92	4.87
Black Canyon of the Gunnison	2.74	1.32	1.36
Bryce Canyon	4.03	1.89	1.96
Canyonlands	8.56	6.32	5.56
Capitol Reef	7.61	4.78	4.21
Flat Tops	3.20	1.37	1.81
Grand Canyon	3.64	1.98	1.81
Mesa Verde	3.08	1.52	1.48
Zion	2.61	1.14	1.22
Average	4.81	2.81	2.70

The CALPUFF modeling that is summarized in this document does not include impacts from other significant sources such as wildfire, windblown dust, other stationary sources, and mobile sources. As can be seen in Figure 13, organic carbon (fire) and coarse mass (windblown dust) are greater contributors to haze than ammonium nitrate on the 20% worst days. So, the modeled results do not give a complete picture of the visibility improvements that will be seen by visitors to Class I areas, especially on the worst days that are impacted by other emission sources.

Figure 13. Particle Contribution on Haziest Days



C. Energy and non-air quality benefits

Energy and non-air quality environmental impacts are one of the factors listed in section 169A(g)(2) that must be considered when determining BART. The alternative would avoid the energy penalty due to operating an SCR unit. PacifiCorp quantified the energy penalty associated with SCR in their August 4, 2014 BART Analysis Update, Appendix A. The energy penalty was included as part of the total cost for installing SCR on each of the units.

Table 13. SCR Energy Penalty

	Energy Penalty	
	kW	$/yr
Hunter Unit 1	2,090	$494,247
Hunter Unit 2	2,090	$494,247
Huntington Unit 1	2,182	$516,098
Huntington Unit 2	2,182	$516,098
Total	**8,544**	**$2,020,690**

The Carbon Plant, like most coal-fired power plants, produces solid wastes in the form of fly ash from the ESPs controlling both units, as well as the bottom ash conveyors which clean the residuals from both boilers. This ash is currently being landfilled. The plant also runs water through both steam generating units (the boilers), as well as a pair of cooling towers. This uses water, and has an associated wastewater discharge. Hauling the ash to landfill requires additional fuel use and water or chemical dust suppression for minimization of fugitive dust control. Finally, for maintenance and emergency purposes, the plant has a number of emergency generators, fire pumps, and ancillary equipment - all of which must be periodically operated, tested and maintained - with associated air emissions, fuel use, painting, and the like. All of these non-air quality impacts are reduced as the result of the closure of the Carbon Plant.

D. Cost

PacifiCorp noted in their comments on the proposed SIP revision that the Alternative Measure not only produces greater reasonable progress, including lower emissions and improved visibility, but it does so at a significant capital cost savings to PacifiCorp and its customers as compared to the most stringent NOx technology and limits. While DAQ has not officially determined the cost of installing SCR on the four units, it is clear that it would be a significant cost. On the other hand, the Carbon Plant has already been closed due to the high cost of complying with the MATS rule. The costs to Utah rate payers (and those in other states served by PacifiCorp) to replace the power generated by the Carbon Plant have already occurred; there will be no additional cost to achieve the co-benefit of visibility improvement. In other words, the Alternative Measure achieves better visibility improvements than would be achieved by requiring SCR as BART at the four EGUs, and at a significantly lower cost. This presents a classic "win/win" scenario –the Alternative Measure results in greater reasonable progress and that greater reasonable progress is achieved at a much lower price compared to SCR. Cost is one of the factors listed in section 169A(g)(2) that should be considered when determining BART.

E. Summary of Weight of Evidence

The weight of evidence shows that the alternative program will provide greater reasonable progress than BART. Combined emissions of NOx, SO_2, and PM will be 2,856 tons/yr lower under the alternative scenario. Reductions were achieved earlier than was required by the rule, providing a corresponding early and on-going visibility improvement. The alternative program provides greater reductions of SO_2, the most significant anthropogenic pollutant affecting Class I Areas on the Colorado Plateau that affects visibility year-round, including the high visitation seasons of spring, summer, and fall. Finally, visibility modeling shows that the alternative will provide visibility improvement on a greater number of days, greater average improvement, and greater improvement on the 90th percentile deciviews across all Class I areas.[17,18]

[17] Greater reasonable progress can be demonstrated using one of two methods: (i) "greater emission reductions" than under BART (40 C.F.R. §51.308(e)(3)); or (ii) "based on the clear weight of evidence" (40 C.F.R. §51.308(e)(2)(E)). As the U.S. Circuit Court of Appeals for the 10th Circuit recently observed, the state is free to choose one method or the other. *WildEarth Guardians v. E.P.A.*, 770 F.3d 919, 935-37 (10th Cir. 2014). The court characterized the former approach as a "quantitative" and the later as "qualitative," and specifically sanctioned the use of qualitative factors under the clear weight of evidence.

[18] EPA has proposed approval of an Alternative Measure for the Apache Generating Station in Arizona on similar "weight of evidence" grounds. 79 Fed. Reg. 56,322, 56,327 (Sept. 19, 2014). EPA has also approved a similar Alternative Measure in Washington based, in part, on a reduction in the number of days of impairment greater than 0.5 dv and 1.0 dv. 79 Fed. Reg. 33,438, 33,440-42 (June 11, 2014).

IX. Timing of NOx Emission Reductions under Alternative Measure and Monitoring, Recordkeeping, and Reporting

40 CFR 51.308(e)(2)(iii) A requirement that all necessary emission reductions take place during the period of the first long-term strategy for regional haze. To meet this requirement, the state must provide a detailed description of the emission trading program or other alternative measure, including schedules for implementation, the emission reductions required by the program, all necessary administrative and technical procedures for implementing the program, rules for accounting and monitoring emissions, and procedures for enforcement.

The schedule for installation of the NOx controls required by the alternative measure is shown in Table 14. The alternative measure will be fully implemented prior to 2018, the end of the first long term strategy for regional haze.

Table 14. Implementation Schedule

Unit	Year Installed or Required
PacifiCorp Hunter Unit 1	2014
PacifiCorp Hunter Unit 2	2011
PacifiCorp Hunter Unit 3	2008
PacifiCorp Huntington Unit 1	2010
PacifiCorp Huntington Unit 2	2006
PacifiCorp Carbon Unit 1	2015
PacifiCorp Carbon Unit 2	2015

The enforceable emission limits, administrative and technical procedures for implementing the program, rules for accounting and monitoring emissions, and procedures for enforcement are addressed in SIP Section IX, Parts H.21 and 22.

X. Emission Reductions are Surplus

40 CFR 51.308(e)(2)(vi) A demonstration that the emission reductions resulting from the emissions trading program or other alternative measure will be surplus to those reductions resulting from measures adopted to meet requirements of the CAA as of the baseline date of the SIP.

A. Baseline Date of the SIP

When the regional haze rule was promulgated in 1999, EPA explained that the "baseline date of the SIP" in this context means "the date of the emissions inventories on which the SIP relies."[19] The baseline inventory for the regional SO_2 milestones and backstop trading program in Utah's 2003 SIP was 1990 while the inventory for the remaining elements in the 2003 SIP, including enhanced smoke management, mobile sources, and pollution prevention, was 1996. When the RH SIP was updated in 2008, a new baseline inventory of 2002 was established for regional modeling, evaluating the impact on Class I areas outside of the Colorado Plateau, and BART as outlined in EPA Guidance[20] and the July 6, 2005 BART Rule.[21] For purposes of evaluating an alternative to BART, the later baseline date of 2002 is therefore most appropriate. 2002 is the baseline inventory that was used by other states throughout the country when evaluating BART under the provisions of 40 CFR 51.308. Any measure adopted after 2002 is considered "surplus" under 40 CFR 51.308(e)(2)(iv)[22]. To make a valid comparison that the "alternative measure will be surplus to those reductions resulting from measures adopted to meet requirements of the CAA as of the baseline date of the SIP" as required by 40 CFR 51.308(e)(2)(iv), the Most Stringent NOx scenario includes measures required before the baseline date of the SIP but does not include later measures that are credited as part of the alternative scenario.

B. SO_2, NOx, and PM Reductions from the Closure of the PacifiCorp Carbon Plant

Utah met the BART requirement for SO_2 as provided under 40 CFR 51.309(d)(4) through the establishment of SO_2 emission milestones with a backstop regulatory trading program to ensure that SO_2 emissions in the 3-state region of Utah, Wyoming, and New Mexico decreased substantially between 2003 and 2018. The final SO_2 milestone in 2018 was determined to provide greater reasonable progress than BART and the overall RH SIP was deemed to meet the reasonable progress requirements for Class I areas on the Colorado Plateau and for other Class I areas[23]. The modeling supporting the RH SIP included regional SO_2 emissions based on the 2018 SO_2 milestone and also included NOx and PM

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[19] 64 FR 35742, July 1, 1999

[20] Memorandum from Lydia Wegman and Peter Tsirigotis, 2002 Base Year Emission Inventory SIP Planning: 8-hr Ozone, PM2.5, and Regional Haze Programs, November 8, 2002.

[21] 70 FR 39143, July 6, 2005

[22] Utah's actions here are consistent with EPA's actions in other states. *See e.g.,* 79 Fed. Reg. at 33,441-42; 79 Fed. Reg. at 56,328.

[23] 77 FR 74355, December 14, 2012

emissions from the Carbon Plant. Actual emissions in the 3-state region are calculated each year and compared to the milestones. As can be seen in Table 15, the 2018 milestone was met seven years early in 2011 and SO_2 emissions have continued to decline. The most recent milestone report for 2013 demonstrates that SO_2 emissions are currently 26% lower than the 2018 milestone. The Carbon Plant was fully operational in the years 2011-2013 when the 2018 milestone was initially achieved for those years. Therefore the SO_2 emission reductions from the closure of the Carbon Plant are surplus to what is needed to meet the 2018 milestone established in Utah's RH SIP.

Table 15. SO_2 Milestone Trends

	Milestone	Three Year Average SO_2 Emissions (tons/yr)	Carbon Plant SO_2 Emissions (tons/yr)
2003	303,264	214,780	5,488
2004	303,264	223,584	5,642
2005	303,264	220,987	5,410
2006	303,264	218,499	6,779
2007	303,264	203,569	6,511
2008	269,083	186,837	5,057
2009	234,903	165,633	5,494
2010	200,722	146,808	7,462
2011	200,722	130,935	7,740
2012	200,722	115,115	8,307
2013	185,795	105,084	7,702
2014	170,868		
2015	155,940		
2016	155,940		
2017	155,940		
2018	141,849		

The Carbon Plant was built in the 1950s and is therefore grandfathered under Utah's permitting rules. The plant is equipped with an electrostatic precipitator for PM control and has no SO_2 or NOx controls. PacifiCorp shut down the Carbon Power Plant on April 14, 2015 due to the high cost to control mercury to meet the requirements of EPA's new Mecury and Air Toxics Standards (MATS) rule. The MATS rule was finalized in 2011, well after the 2002 base year for Utah's RH SIP, and therefore any reductions required to meet the MATS rule are clearly surplus and may be considered as part of an alternative strategy under 40 CFR 51.308(e)(2)(vi). While PacifiCorp has shut down the Carbon Plant, this decision is not enforceable, and PacifiCorp could choose to meet the MATS requirements through other measures. On November 25, 2014, the Supreme Court agreed to consider challenges to the MATS rule, so there is a possibility that the mercury control requirements could be overturned or delayed. An enforceable requirement is included in Section IX.H.22 of the SIP to make the permanent closure of the Carbon Plant enforceable by August 15, 2015. This provision will ensure that the substantial emission reductions that are relied upon as part of the alternative strategy will occur if the MATS rule is overturned or delayed.

C. PacifiCorp Hunter Unit 3

PacifiCorp upgraded the low-NOx burners on Hunter Unit 3 in 2008. This upgrade was not required under the requirements of the Clean Air Act as of the 2002 baseline date of the SIP and is therefore clearly considered surplus and may be credited in the alternative program under 40 CFR 51.308(e)(2)(vi). Prior to the 2008 upgrade, the emission rate for Hunter Unit 2 was 0.46 lb/MMBtu heat input for a 30-day rolling average as required by Phase II of the Acid Rain Program.

XI. Visibility Analysis

40 CFR 51.308(e)(3) A State which opts under 40 CFR 51.308(e)(2) to implement an emissions trading program or other alternative measure rather than to require sources subject to BART to install, operate, and maintain BART may satisfy the final step of the demonstration required by that section as follows: If the distribution of emissions is not substantially different than under BART, and the alternative measure results in greater emission reductions, then the alternative measure may be deemed to achieve greater reasonable progress. If the distribution of emissions is significantly different, the State must conduct dispersion modeling to determine differences in visibility between BART and the trading program for each impacted Class I area, for the worst and best 20% of days. The modeling would demonstrate "greater reasonable progress" if both of the following two criteria are met:

(i) Visibility does not decline in any Class I area, and

(ii) There is an overall improvement in visibility, determined by comparing the average differences between BART and the alternative over all affected Class I areas.

The Hunter, Huntington, and Carbon plants are all located within 40 miles of each other in Central Utah. Because of the close proximity of the three plants, the distribution of emissions will not be substantially different under the alternative program. As described in section VII, combined emissions of all three pollutants are 2,856 tons/yr lower under the alternative measure . Therefore, the alternative measure may be deemed to achieve greater reasonable progress than BART.

Utah has chosen to use a weight-of-evidence approach under 40 CFR 51.308(e)(2)(i)(E), as described in section VIII of the staff review. The separate visibility analysis described in section VIII is part of the weight-of-evidence demonstration and is not intended to provide the type of modeling demonstration that would otherwise be required under 40 CFR 51.308(e)(3).

XII. Reasonable Progress

The WRAP compiled regional inventories and completed regional modeling to support the development of RH SIPs in the western states. For all of these analyses, WRAP assumed continued operation of the

Carbon plant. There were two projected inventories that were used by western states depending on when their SIPs were completed: PRP18a and PRP18b. These inventories assumed BART emission reductions from Hunter Units 1 and 2 and Huntington Units 1 and 2 based on the presumptive BART emission rate established in 40 CFR Part 51 Appendix Y, or actual emissions if lower. As can be seen in Table 16, the NOx emissions from the Carbon plant (shown as reductions in the 4th column) are comparable to the WRAP projected inventories while the SO_2 emissions were about 1,200 tons higher than the WRAP projected inventory. However, current SO_2 emissions for the Hunter and Huntington Plant are lower than had been projected, so when SO_2 emissions from all three plants are combined, the total is less than had been projected by the WRAP. The last column in the table shows that even if the emission reductions from the Carbon plant and Hunter 3 are excluded, the NOx, SO_2, and PM_{10} emissions are lower than the WRAP projected inventories. The emission reductions from the Carbon plant and Hunter 3 were not necessary or other states to meet their reasonable progress goals and therefore provide an added benefit for other states.

Table 16. Comparison of Alternative Measures to Reasonable Progress Inventories

NOx	PRP18a	PRP18b	Alternative	Reductions Carbon and Hunter 3	Alternative with Reductions Excluded
Carbon	3,366	3,366	0	3,348	3,348
Hunter	15,331	16,503	11,446	1,908	13,354
Huntington	8,251	8,559	7,437		7,437
Total	26,947	28,429	18,883	5,256	24,139

SO_2	PRP18a	PRP18b	Alternative	Reductions Carbon and Hunter 3	Alternative with Reductions Excluded
Carbon	6,824	6,824	0	8,005	8,005
Hunter	6,109	6,350	4,091		4,091
Huntington	3,811	3,955	2,355		2,355
Total	16,744	17,129	6,446	8,005	14,451

PM_{10}	PRP18a	PRP18b	Alternative	Reductions Carbon and Hunter 3	Alternative with Reductions Excluded
Carbon	221	221	0	573	573
Hunter	1,049	1,049	460		460
Huntington	654	654	376		376
Total	1,924	1,924	836	573	1,409

Combined	PRP18a	PRP18b	Alternative	Reductions Carbon and Hunter 3	Alternative with Reductions Excluded
Carbon	10,411	10,411	0	11,926	11,926
Hunter	22,489	23,903	15,997	1,908	17,905
Huntington	12,716	13,169	10,168		10,168
Total	45,615	47,482	26,165	13,834	39,999

XIII. Future Planning

The regional haze program is designed to achieve a long-term goal and updated SIPs are required every 10 years to ensure continued progress. The DAQ is beginning work on a RH SIP that will address the next planning period of 2018 – 2028. This next RH SIP is due in 2018, and the DAQ anticipates that this SIP will be completed in parallel with planning efforts to meet the new ozone standard that will be finalized in October, 2015. Both regional haze and ozone are affected by regional NOx emissions, and the DAQ anticipates that common emission strategies will lead to improvements in both areas. Significant technical work must be completed before these common benefits can be quantified in the next RH and ozone SIP.